5E: OIL, GAS AND OTHER MINERAL RESOURCE EXTRACTION

Offshore oil and gas facilities have been operating in California since the late 1800's. Government management and regulation of these operations began with efforts to help solve mineral ownership disputes and to standardize drilling practices. However, environmental problems, brought on in part by rapid growth in the industry throughout this century, led to increased regulation. Commercial mining operations for other mineral resources such as sand, gravel, stone, and salt exist within inland watersheds, enclosed coastal waters and in some nearshore ocean waters along the California coastline. Exploration for these non-petroleum mineral resources offshore have not been extensive. Recreational collecting of mineral resources also occurs in inland watersheds, enclosed waters and nearshore ocean waters. The analysis that follows includes oil and gas leasing activities in State and federal waters; perspectives on California offshore oil reserves; oil transportation; spill prevention and cleanup; oil and gas production, storage and transportation facilities; extended reach drilling techniques, and the status of other types of mineral resource extraction.

BACKGROUND

Offshore Oil and Gas

In 1992, ocean-dependent oil and gas activities were estimated to have contributed $850 million to the State's economy, employing approximately 25,600 people (California Research Bureau 1993), although the Western States Petroleum Association estimates that this figure could be up to two times higher. The State has had to balance economic benefits against the adverse impacts to coastal views, fisheries, tourism, air quality, the health of marine resources, and both direct and indirect impacts to onshore communities. Concerns regarding the cumulative impacts of offshore oil and gas development, combined with a number of major marine oil spills throughout the world in recent years, have led to a permanent moratorium in California on offshore oil and gas leasing in State waters and a deferral of leasing in federal waters until the year 2002. However, development on existing State and federal leases is not affected and may still occur within offshore areas leased prior to the implementation of leasing restrictions.

The 1969 blowout and oil spill from Unocal's platform A in the Santa Barbara Channel received international attention and was a major catalyst in the development of modern environmental law in the United States. The spill influenced the passage of major State and federal legislation, such as the National Environmental Policy Act (NEPA), Clean Water Act, California Environmental Quality Act (CEQA), California Coastal Initiative in 1972 (Proposition 20), and California Coastal Act of 1976. Pursuant to these and other statutes, development permits for onshore or offshore oil and gas facilities cannot be issued without provisions to protect terrestrial, marine, visual, recreational, and air resources.

Currently, there are twenty-six production platforms, one processing platform and six artificial oil and gas production islands located in the waters offshore California. Of the twenty-seven platforms, four are located in State waters offshore Santa Barbara and Orange Counties, and twenty-three are located in federal waters offshore Santa Barbara, Ventura and Los Angeles Counties. Four platforms in State waters off Santa Barbara County (Chevron's platforms Hazel, Hilda, Hope, and Heidi) were abandoned and removed in 1996. There are also eighty marine terminals in State waters and numerous land-based oil production, transportation, and storage facilities.

Other Mineral Resource Extraction

Some commercial mineral resource extraction operations in California's inland watershed, enclosed waters and nearshore ocean zones have proven to be economically viable. Recreational collecting in these areas also continues to be popular with the public, but is relatively limited in scope. Mineral extraction in deep ocean waters off California's coast have been considered in the past, but were dismissed due to technical, economic, and environmental considerations. However, deep ocean operations may be proposed again in the future with advancing technologies.

Enclosed Waters and Nearshore Ocean Zones. Several mineral resource extraction activities occur, or have occurred in the recent past, near or along the California shoreline. These activities include:

- production of sodium chloride (salt), magnesium and magnesium compounds, bromine and other chemicals from sea water and brine in the San Francisco Bay and San Diego Bay areas;
- mining stone for rip rap and aggregate from Santa Catalina Island;
- mining oyster shells for cement, poultry grit, and soil conditioner from San Francisco Bay;
- dredging sand and silt for fill material in multiple areas;
- dredging sand for various uses, including as an ingredient in portland cement concrete;
- mining specialty sand in the Monterey Bay Area ; and
- small scale mineral collection along several areas of the coast, such as recreational jade collection along the Big Sur coastline.

Offshore Ocean Zone. A wide variety of mineral resources exist offshore the California coast, but commercial extraction has been limited to mostly exploration activities due to technical and economic constraints. Such mineral resources include:

- sand and gravel for aggregate from various areas, including the outer continental shelf of Southern California (San Pedro Shelf and San Diego Shelf);
- heavy minerals which could provide sources of titanium, gold, rare-earth elements, and platinum (various areas off the California coast);
- barite nodules on the continental shelf (east of San Clemente Island, southwest of San Nicolas Island, southwest slope of Cortes Bank, Patton Escarpment, southwest of Navy Bank);
- manganese nodules containing manganese, nickel, cobalt, and copper (primarily on abyssal ocean floor and submarine ridges, sporadically on lower continental slope); and
- polymetallic sulfides on ridges (spreading centers), possibly in Northern California offshore areas.

ISSUE ANALYSIS

Future Offshore Leasing For Oil and Gas Found Unacceptable

New leasing for oil and gas development off the California coast in State Tidelands and the federal Outer Continental Shelf (OCS) has been determined by the State of California to result in unacceptable impacts to ocean and coastal resources. Some of these impacts include:

- visual impacts of offshore platforms on coastal communities;
- navigation risks from the increased number of platforms, exploratory rigs, and support vessel activity;
- drill muds and cuttings dumping, and the impact of this dumping on the water column and bottom communities in the vicinity of the drilling platform;
- air quality impacts from existing development and the need to obtain offsets for all new exploration, production, and transportation activities;
- oil spills from a variety of oil exploration, production, or transportation operations and the lack of effective methods for cleaning up those spills;
- ecosystem degradation caused by additional oil and gas development impacting marine managed areas in both State and federal waters, including sanctuaries, seashores, reserves, preserves, refuges, underwater parks, and areas of special biological significance; and
- cumulative impacts on air quality, commercial fisheries, scenic quality, marine resources, vessel traffic safety, and land resources from existing, approved, proposed, or projected developments.

As a result of these impacts, Governor Wilson, the legislature, many State and federal agencies, and local citizen activist groups worked to eliminate future leasing in State waters and to defer any future OCS oil and gas leasing off the California coast until 2002.

Leasing State Tidelands

The California State Lands Commission (SLC) is responsible for leasing State Tidelands for oil and gas development. Although new offshore development in State waters reached a near stand-still following the 1969 Santa Barbara oil spill, prior leasing of these offshore waters resulted in a total of 38 tracts and approximately 95,000 acres of State submerged lands under lease for oil and gas development (approximately 82,000 acres within the Santa Barbara Channel region).

The SLC is now prohibited from leasing State-owned tidelands for oil and gas extraction from the Mexican border north to the Oregon border pursuant to the California Coastal Sanctuary Act of 1994. This legislation replaced a previously complex mix of legislative prohibitions and administrative actions that eliminated new leasing by the State Lands Commission. These prohibitions were permanent for some areas, expired in 1995 and 2003 in other areas, and were administrative rather than statutory in others. The California Coastal Sanctuary Act provides a clear State position by creating a single State oil and gas leasing sanctuary where no further leasing will occur unless the legislature acts to eliminate or modify the law's provisions, or leasing is initiated in response to a national energy crisis, as provided for in the law. However, the Act does not preclude new development on tracts leased prior to its enactment.

Leasing the Federal Outer Continental Shelf

The Department of the Interior's Minerals Management Service is the federal agency charged with leasing waters in the OCS (beyond three nautical miles from shore). After long legal battles and subsequent amendments to the Outer Continental Shelf Lands Act and the Coastal Zone Management Act, it was determined that State coastal management agencies have the authority to review federal government lease sales for consistency with approved Coastal Management Programs, as well as consistency review authority over plans to explore and produce oil and gas resources**.** The California Coastal Commission is

the Coastal Management Agency for the California OCS. Currently there are 92 active leases in the OCS offshore California, encompassing 465,126 acres. There are 85 active leases off one Tri-County Area

(San Luis Obispo, Santa Barbara, Ventura) with 43 producing, and 42 non-producing. The remaining 7 active leases are located in the Los Angeles and Orange County Planning Area (Minerals Management Service 1995).

The State has repeatedly informed the Department of the Interior that the size of past lease offerings were too large, the locations were often too close to environmentally sensitive areas, the pace of the offerings were too rapid to adequately assess the impacts, and the lease sales were inappropriate in the absence of a comprehensive national energy strategy. The State has urged the Department of the Interior to respond to the National Academy of Sciences finding that the socio-economic impacts of leasing have not been adequately addressed. In addition, the State has called on the federal government to develop a total energy plan which would consider energy conservation and renewable energy sources, in addition to the plans to develop offshore oil and gas resources.

In June of 1990, at the urging of Governor Wilson, the Coastal Commission, and other concerned parties, President Bush deferred leasing off the coast of Northern, Central, and most of Southern California until the year 2000. In further response to this policy position, the final Five Year Oil and Gas Leasing Program 1997-2002 developed by the Department of the Interior includes no proposed lease sales off the coastlines of California, Oregon, or Washington between 1997 and 2002. These deferrals are, in part, a response to comments from the State of California regarding the cumulative impacts of existing, approved, proposed, and projected development. To eliminate any possibility of OCS leasing activities off California, the Governor continues to support the annual moratorium on the Department of Interior budget prohibiting spending on leasing activities for future oil and gas development off the California coast. Consistent with his overall position on OCS leasing and ocean protection, the Governor supported the designation of the largest proposed boundary for the Monterey Bay National Marine Sanctuary, which was later adopted. This Sanctuary, the largest of its kind in the United States, provides permanent protection from oil and gas leasing and development activities within approximately 5,312 square miles of the OCS off the Central California coast.

Perspective On California Offshore Oil and Gas Reserves

Proven oil and gas reserves off the California coast would contribute to energy supply, but these reserves are respectively less than one-third and one-tenth of onshore California reserves, and substantially less than national or international reserves. Proven reserves within California State tidelands are currently estimated at approximately 246.2 million barrels of oil and 62.7 billion cubic feet of gas, while proven reserves within the federal OCS have been estimated at approximately 595.7 million barrels of oil and 137 billion cubic feet of gas (Division of Oil, Gas and Geothermal Resources 1995). The oil reserves located in California State Tidelands represent roughly 1 percent of the U.S. total reserves, while oil reserves in federal waters offshore California represent about 2.6 percent.

Proven oil reserves for onshore areas in California are far more extensive adding up to nearly 2.7 billion barrels or 12.0 percent of U.S. reserves (Division of Oil, Gas and Geothermal Resources 1995). In contrast, the total U.S. oil reserves are just over 22.3 billion barrels, representing about 2.3 percent of world reserves (National Energy Information Center 1996). Proven oil reserves in the Middle East are substantially higher, totalling approximately 662 billion barrels or 66.5 percent of world reserves. Total world oil reserves are estimated at approximately one trillion barrels of oil. (National Energy Information Center 1994).

Oil production from leases on the OCS and within State Tidelands off the California coast total 250,000 barrels per day, which is roughly 4.0 percent of existing U.S. production. A substantial amount of the acreage currently under lease in the federal OCS in the Santa Barbara Channel and the Santa Maria Basin remains undeveloped. (Division of Oil, Gas and Geothermal Resources 1995).

California contributes to energy independence in other ways. The State has instituted a number of energy conservation measures to reduce energy consumption, demonstrating that population and economic growth are not inextricably linked to increases in energy consumption. California has the sixth largest economy in the world, and is the largest and fastest growing state in the nation (an increase of nearly 10 million

people, or 46 percent growth, between 1975 and 1993). Yet, as a result of its energy policies and programs, California used 36 percent less energy per dollar of economic output than the national average in 1993, an energy equivalent savings of approximately 687 million barrels of oil per year. In fact, California's per capita energy consumption was 19 percent lower in 1993 compared to 1975, while U.S. average per capita energy consumption was only 0.7 percent lower. On an energy equivalent basis, Californians use approximately 38 barrels of oil per year per capita, compared to a national average of 56 barrels. (California Energy Commission 1995; Office of Energy Markets and End Use 1995).

Cumulative Impacts of Oil and Gas Operations

Cumulative impacts from existing oil and gas development, or from future development, in State and federal waters on existing leased tracts has never been thoroughly understood or evaluated. Cumulative impact analysis is complicated because it entails evaluating existing, approved, proposed, and projected developments and determining how these developments would cumulatively impact a variety of resources. Questions include the potential impacts of development scenarios on other industries, such as California's tourism industry, which contributed $9.9 billion to the State's economy in 1992, or the commercial fishing and mariculture industry, which contributed 17,000 jobs and $554 million in 1992 (California Research Bureau 1993). Cumulative impacts analysis also requires a thorough inventory and comprehensive evaluation of air quality degradation, drilling muds toxicity, vessel traffic hazards, oil spill probability, visual quality disruption, and impacts to local communities (particularly in the north coast) where onshore support facilities (processing, pipelines, marine terminals, oil spill response centers) would potentially have to be developed.

The Minerals Management Service (MMS) Pacific OCS Region has initiated a cooperative study with State and local governments and the oil and gas industry to evaluate the onshore impacts and development constraints for various levels of offshore oil and gas development on existing leased areas. This evaluation, titled the *California Offshore Oil and Gas Energy Resources Study* (COOGER), is focusing on development from currently leased oil and gas tracts off the coastlines of San Luis Obispo, Santa Barbara, and Ventura counties, and is intended to provide a common base of information for future decisions regarding oil and gas activities. The study, funded by the MMS and oil and gas industry, is exploring existing and future onshore constraints associated with five hypothetical exploration and development scenarios for the undeveloped and unexplored leased tracts within the study area between 1994 and 2014. The COOGER study will not produce a decision making document; its purpose is to provide a source of public information to help the public, government, and industry learn more about the onshore effects of offshore development from a broad perspective, and without the constraints associated with a specific project application.

Oil Transportation

All oil produced offshore California is required under State law to be transported to market destinations using the least environmentally damaging methods that can feasibly be provided. Evaluating options for transporting crude oil produced offshore has been, and continues to be, highly controversial, disputed and subject to litigation. Risk analysis and environmental research data conducted over the past 20 years demonstrates that onshore pipeline transportation will result in substantially reduced oil spill and air quality impacts as compared to marine tankering. Major oil spills occurring from ocean-going tankers over the past 30 years, and the risk of similar spills in the future, have been key factors in public concern over this issue. In 1984, the State Legislature amended the Coastal Act to proclaim that pipeline transportation of offshore crude oil is "generally both economically feasible and environmentally preferable to other forms of crude oil transport" (PRC Section 30265 (b)).

In the early 1980's, the Coastal Commission concurred with federal consistency certifications to permit the construction and operation of three oil and gas production platforms in the OCS offshore Santa Barbara County (known as the Point Arguello Field). The concurrence was based on commitments that produced oil would be transported to Los Angeles refineries by pipeline. From 1989 to 1991, the Point Arguello Field oil and gas producers pursued a County permit to tanker oil from Point Arguello Field maintaining, in part, that tankering was necessary due to inadequate capacity to transport OCS crude from Santa

Barbara County to Los Angeles via pipeline. The first two permits were denied (one on appeal to the Coastal Commission and the second by the County) and the third was approved, although the Point Arguello producers found the conditions unacceptable.

In 1992, the Secretary for Resources helped facilitate discussions regarding the transportation of Point Arguello oil from the Gaviota Marine Terminal. The Secretary convened a series of meetings between Point Arguello producers, the Coastal Commission, Santa Barbara County, and the local environmental community, to develop a resolution to the oil transportation dispute. These discussions led to the Coastal Commission's January 1993 decision to grant a permit to the Point Arguello producers to use marine tankers for transporting Point Arguello oil to Los Angeles area refineries until January 1, 1996. After January 1, 1996 all Point Arguello oil was to be transported to refinery destinations exclusively by pipeline. During the term of the permit, ongoing authority to tanker oil was contingent upon the Point Arguello producers satisfying certain milestones for the permitting, construction, and eventual operation of a new pipeline capable of transporting crude oil produced offshore Santa Barbara County to the Los Angeles area. Failure to meet these milestones would result in cessation of tankering. The permit required the Point Arguello producers to submit by February 1, 1994 a fully executed oil throughput agreement with a company that had obtained all necessary discretionary government approvals to construct a new pipeline. The Point Arguello producers did not submit an executed agreement by the February deadline and all tankering of this crude oil has now ceased.

Currently, the only one common carrier pipeline in place that could transport Point Arguello or other Santa Barbara OCS crude oil to Los Angeles is Arco Pipe Line Company's (APLC) Line 63, but capacity in this line is limited. The need for additional pipeline capacity to Los Angeles is intensified by the loss of APLC's Line 1 from Kern County to Los Angeles due to damage caused by the January 1994 Northridge earthquake. At the same time, Exxon is expanding production in the Santa Ynez Unit in the western Santa Barbara Channel, placing additional demands on oil transportation facilities from Santa Barbara to Los Angeles.

OCS oil shippers' interim response to the pipeline capacity constraints from Santa Barbara to Los Angeles has been to either (1) send the oil to other refinery centers, such as the San Francisco Bay Area, Bakersfield or Texas using existing pipeline systems, (2) seek authorization to tanker oil from a Gaviota marine terminal to Los Angeles, or (3) move the oil north via pipeline to the San Francisco Bay Area and then use marine tankers to transport the oil back down the coast to Los Angeles.

In order to address the long term need to provide additional pipeline capacity to Los Angeles, the APLC decided to reverse the flow of its Line 90 pipeline (which currently transports Alaska crude from Los Angeles to Texas) and expand the throughput capacity of Line 63 by about 15,000 barrels per day. Another transportation option could be provided by two pipeline proposals currently in progress. In April 1996, the California Public Utilities Commission certified an EIS/EIR for the proposed Pacific Pipeline - - a 132 mile long common carrier crude oil pipeline designed to transport up to 130,000 bbls/day of Santa Barbara offshore crude oil and San Joaquin Valley oil to Los Angeles. In addition, in May 1995, the Cajon Pipeline Company and the Edison Pipeline and Terminal Company, signed a Joint Development Agreement to construct the Cajon-Edison Pipeline designed to carry Santa Barbara OCS and San Joaquin Valley oil to Los Angeles. To date, neither proposal has received all the necessary approvals for construction and operation. It is not clear when, or if, these proposals will receive full authorization since proposals to site, expand or even replace new pipelines have often been subject to considerable opposition in the communities traversed by these routes.

Oil Spill Prevention and Clean-up

The State has developed a major oil spill prevention and response program pursuant the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act of 1990 (Chapter 1248, Stats.1990; often referred to as SB 2040, even though it has been amended several times since 1990). SB 2040 established the Office of Oil Spill Prevention and Response (OSPR) and required the State of California to develop a comprehensive program to assure that the "best achievable" programs are available to prevent oil spills and to respond to those that do occur. Some OSPR programs and achievements include:

- receipt and ongoing review of oil spill contingency plans for vessels, and oil and gas facilities,
- completion of a marine oil spill contingency plan for the State of California,
- development of statewide marine resource information on a computer-based geographic information system,
- implementation of statewide oil spill prevention and response education programs,
- construction and operation of oiled wildlife rehabilitation facilities,
- placement of field biologists and enforcement personnel in strategic locations along the entire California coast to assure rapid response to oil spills by trained personnel,
- ongoing activities of the industry/government harbor safety committees to develop navigation safety plans for submittal to the Administrator for Oil Spill Prevention and Response (Administrator), and
- a comprehensive coastal protection review and evaluation required by SB 2040 to ensure the best achievable oil spill prevention and response measures using best available technology are being provided by the oil and gas industry.

Coastal Protection Review. The Coastal Protection Review (CPR) mandated by SB 2040 is a comprehensive review and evaluation of the overall state of preparedness to prevent or respond to an oil spill in California marine waters. This review is required 18 months following the submittal of oil spill contingency plans for tank vessels and marine facilities to the Administrator. Submission of these plans is scheduled to occur every two years, but will be reduced to every five years beginning in 2003. The Administrator must ensure that the plans, as a whole, provide the best achievable protection of coastal resources. It is anticipated that the findings and recommendations of the first CPR will be released in the fourth quarter of 1996. The CPR uses data from State and local sources, as well as the Area Contingency Planning process required under the federal Oil Pollution Act of 1990.

The primary focus of the CPR is to reduce the risk to California's coastline, reviewing in detail the risk of discharges from tank vessels and marine facilities, equipment and technologies to offset potential discharges, the subsequent threat to sensitive resources, and the status of prevention and preparedness programs. The CPR report of findings and recommendations will include a review of each coastal region to provide a reasonable "snapshot" of the state of protection along the entire California coast. It is anticipated that the first CPR report will provide oil spill statistics for both California and the United States which identify a recent reduction in the rate of spills from vessels and marine facilities. While the vast majority of oil spills from vessels are small, the potential for large or even catastrophic oil spills continues to exist, with several large oil spills occurring worldwide each year.

Over 480 marine facilities exist throughout California, each posing a risk of spilling oil into marine waters. The majority of spills reported in recent years from marine facilities were less than 50 gallons, and occurred most frequently at marine terminals, platforms, and production fields. While pipeline spills do not occur as frequently, some recent spills from aging pipeline systems have released large volumes of oil, and analysts anticipate increasing numbers of spill events from this aging system (Moore, pers. comm.). As a result, the OSPR conducted a review of pipeline regulatory jurisdictions in California which identified a complicated array of agencies and regulations that apply to pipeline operations in California. OSPR staff anticipate that the first CPR report will recommend that the spill prevention regulations of all State agencies relating to pipelines and other marine facilities be reviewed to bring greater consistency and uniformity. OSPR and other State and federal agencies with oil spill prevention or response programs are already pursuing agreements to further refine areas of jurisdiction and consistency for requirements imposed on

the regulated community. Agreements have been made with the MMS, SLC, and U.S. Coast Guard, while future agreements are anticipated with the Department of Toxic Substances Control and Department of Conservation's Division of Oil, Gas and Geothermal Resources. Additionally, OSPR maintains inter-agency agreements with core State agencies to fulfill statutory requirements in oil spill prevention or response programs.

SB 2040 requires the Administrator to evaluate the ability of State prevention and response programs to meet a rigorous standard of "best achievable protection" of coastal resources and report such findings through the CPR. The 1995 draft CPR report found that best achievable protection has not yet been provided, but it includes a series of recommendations to help California comply with this important legal requirement. Some of the major recommendations OSPR staff anticipate for the first CPR report include:

- *Vessel Traffic Safety*. Expanding voluntary agreements for tankers and barges to transit the coast a safe distance from shore; working to establish permanent international routes to minimize spill threat; consider amending SB 2040 to include the regulation of all ships greater than 300 gross tons; improving aids to navigation and vessel inspection procedures; and expanding the coverage of vessel traffic information systems.

- *New Response and Regulatory Procedures.* Conducting a review of State Agency spill regulations; expanding mutual aid agreements; improving procedures to use oil dispersants and in situ burning; improving data management for statistical purposes; and developing greater compatibility with the emergency procedures of the State Office of Emergency Services.

- *Spill Response and Wildlife Rescue.* Focusing efforts to ensure the adequacy of spill response on the North Coast and in the Monterey Bay Area; working with the Navy to reduce spill risk and improve response at their facilities; improving research and development of new spill response technologies; and continuing to develop a statewide network of wildlife rescue and rehabilitation.

Marine Terminal Safety. SB 2040 delegates specific responsibilities for marine oil terminal safety to the California State Lands Commission (SLC) to protect ocean and coastal resources, as well as public health and safety. These responsibilities include conducting regular inspections, monitoring operations, and adopting regulations and performance standards. Specifically, the statute requires the SLC to confer with the OSPR, and then "adopt rules, regulations, guidelines, and commission leasing policies for reviewing the location, type, character, performance standards, size, and operation of all existing and proposed marine terminals within the State..." The SLC is also charged with periodically reviewing policies and terminal operations manuals to determine if they comply with governing rules, regulations, and guidelines (PRC Sections 8755-8760).

The Marine Facilities Division (MFD) of the SLC has inspected over 60 marine oil terminals, both onshore and offshore facilities, along California's coast. The effort has included above-the-water visual inspection for structural, mechanical and electrical deficiencies. The results have ranged from poor to excellent, with the majority of facilities in the fair to good category; however, major deficiencies have been identified at some facilities. Many of the state's major marine terminal facilities have over 50 years in service. Over the years, operational impacts, seismic events, improper maintenance or poor repair procedures, and pest or corrosion damage have created environmental and safety concerns at some facilities. In addition, major facility operators have requested to bring large tank ships into terminals that were originally designed for substantially smaller vessels. Many of these vessels would be up to ten times larger than those used for the original terminal design and would place additional demands on these aging terminals. The MFD evaluates terminals to determine if they are structurally sound enough to accommodate larger vessels, with mooring line configuration and structural analysis included as part of this verification process.

As part of its inspection and monitoring responsibilities the MFD is working with an advisory group of engineers, port personnel, facility operators, and experts from academic institutions to evaluate the safety and integrity of major oil transfer pipelines at marine terminals. The focus of this effort is to evaluate the ability of these pipelines to withstand a major seismic event. A leak or failure of a major product pipeline

filled with hydrocarbons could create a major oil spill, potentially exceeding the oil volumes associated with an offshore platform failure. One product pipeline for a marine terminal in San Francisco Bay has over 3600 barrels of crude oil in it at all times. A partial structural collapse of this 36-inch line could substantially impact resources within the Bay. (G. Gregory, pers. comm.).

To further satisfy the requirements of SB 2040, the MFD has instituted an "audit" program in cooperation with the U.S. Navy to provide a more complete assessment of the structural and electrical/mechanical systems of marine terminals. The program includes underwater inspections and non-destructive structural testing, with the next step being to formulate guidelines or regulations for the structural repair or upgrading of these facilities. The guidelines are being developed with the assistance of industry, academia and the U.S. Navy to establish satisfactory minimum performance standards for continued use of marine terminals. The audit program results will be coordinated with possible new requirements stemming from the seismic safety evaluation.

Land-Base Pipeline, Production and Storage Facilities. Oil and hazardous materials spills from land-based oil facilities also present a threat to the marine environment. For example, a 1988 oil spill from a storage tank at the Shell Martinez refinery resulted in almost 10,000 barrels of oil spilling into Peyton Slough and flowing into the Carquinez Straits. This incident was caused by equipment failure and human error. Leaks or breaks have also occurred from aging oil pipelines in various locations along the coast. In recent years substantial pipeline spills affecting the ocean have occurred at McGrath Lake in Ventura County and from pipelines associated with Unocal's marine terminal at Port San Luis.

Of significant concern are recently discovered long-term leaks from coastal oil pipelines and production operations. For example, diluents (used for thinning heavy crude oil at production sites) have been leaking for an unknown period of time from pipelines at Unocal's Guadalupe oil field in San Luis Obispo County. The volume of diluent spilled is unknown, but is estimated by Unocal to be as much as 8.5 million gallons (in comparison, Exxon Valdez was 11 million gallons). However, the County of San Luis Obispo believes that this volume could be much higher. The spilled diluent soaked into nearby dunes and beach sand and eventually began appearing in nearshore ocean waters. Cleanup operations resulted in the excavation and cleaning of approximately 170,000 cubic yards of contaminated sand on the beach. An EIR is being developed to evaluate the need and possible options for further cleanup operations in the area.

Offshore Oil and Gas Production Platforms

Some offshore oil and gas platforms in State and federal waters are approaching the end of their design life and will have to be retro-fitted, removed or replaced by new production facilities or alternative recovery techniques. Other issues are raised as some of California's offshore oil and gas fields reach the end of economic production and are abandoned, along with both onshore and offshore ancillary production facilities. Platforms reaching the end of their design life may be in areas where abundant petroleum resources would justify ongoing production activities. While the regulatory procedures and preferred technical processes for carrying out abandonment activities are generally clear, they are not well defined for alternatives such as structural retrofits to safely allow continued production. Particular concern has been raised about the safety of offshore oil and gas structures in seismically active areas. The SLC, federal Minerals Management Service (MMS), other agencies, and private sector interests have been participating with experts convened by the American Petroleum Institute (API) to develop workable procedures for re-qualifying the structural integrity of offshore oil and gas production facilities (Mount, pers. comm.).

Both the MMS and SLC have developed draft regulations which would subject older structures (those with over 20 years of service in waters offshore California) to a re-qualification process for survivability from earthquakes and other conditions which could cause stress to the structures. Both agencies are working with experts and the API to address structural engineering issues, with the difficulty being how to transfer modern engineering standards to older structures. Re-qualification could potentially reduce the probability or size of an oil spill resulting from a major seismic event, as well as to reduce injuries or loss of human life on the structure. The SLC staff believe that the expert review currently being conducted will ultimately

provide State and federal officials with improved structural criteria to meet future human and environmental safety objectives.

When a structure is to be abandoned, alternative actions include total removal of facilities, leaving portions of the facilities in place, or using portions of the facilities elsewhere to create artificial reefs. Substantial controversy arises over the latter two actions, with most commercial fishing interests and environmental organizations preferring total removal of all facilities and the sport fishing industry preferring artificial reefs to enhance the availability and potentially the productivity of fish in the region. The Department of Fish and Game has indicated that large metal structures with extensive flat surfaces may not provide the best habitat for fish to increase productivity. To address this issue, the SLC and MMS held a workshop in 1994 concerning these issues for the Santa Barbara Channel and the MMS held a national workshop in 1996 to evaluate the issues for locations throughout the United States. Future workshops are planned by both agencies to continue evaluating options for removal and dismantling of offshore oil and gas facilities in State and federal waters. Decisions regarding these alternatives require a thorough analysis of the potential impacts to marine resources and associated user, cost, and liability issues.

Extended Reach Drilling From Shore

As a result of new developments in drilling technology, oil and gas production wells can now be drilled laterally up to three miles from the point of entry to the area to be produced (Hight, pers. comm.). This technology would allow oil and gas reserves located within currently leased State tidelands to be developed from shore, assuming the reserves are located at sufficient depths. A project being reviewed in Santa Barbara County, known as the "Molino Project," proposes to use extended reach drilling to recover offshore natural gas reserves within State tidelands from onshore facilities. Proposed for siting next to the existing Chevron Gaviota facility, the "sweet" gas would be processed and placed in a Southern California Gas distribution line. The Final Environmental Impact Report for the Molino Project ruled out the alternative of using an offshore production platform to recover this gas after a thorough review of the project economics, as well as the air quality and marine resource impacts (Arthur D. Little 1996).

The advantages of this technology include the potential elimination of offshore production platforms and subsea pipelines. Drilling wells from shore also reduces the risk of oil or other hazardous material spills into the marine environment, as land-based technologies can incorporate large containment dikes and other measures not available at offshore operations. Direct air quality impacts would likely be reduced by onshore projects due to the lack of emissions from offshore construction and daily boat and helicopter operations for transporting supplies and crew members. Disadvantages of this technology include reduced visibility along the shoreline, noise, possible upset conditions (fires, explosions, spills), and potential conflicts with adjoining land users.

Other Mineral Resource Extraction

Inland Watershed, Enclosed Waters and Nearshore Ocean Zones. Sand mining operations were conducted in the Monterey Bay Area for many years and continue within other enclosed bays and inland watersheds. Concerns with these operations include the potential to reduce the supply of sand for beaches located down the coast, which can contribute to coastal erosion. Sand and gravel extracted from river systems can also have substantial environmental impacts by degrading river beds, removing Salmon and Steelhead spawning habitat, increasing siltation, and reducing sand and gravel supply to ocean beaches and shorelines, which can accelerate down coast erosion (Nat'l Marine Fisheries Service 1993).

Taking minerals from designated State Beaches is allowed by the California Department of Parks and Recreation, but the collected materials may not be sold or used commercially. The distinction between commercial and recreational mineral collecting or extraction can sometimes become confusing and has forced both the federal government and the State of California to consider procedures for addressing this issue. For example, jade has been collected for years by scuba divers within Jade Cove, a small stretch of Big Sur coastline located within State Tidelands and the Monterey Bay National Marine Sanctuary (MBNMS). The majority of jade collecting is for relatively small pieces used in personal collections or for sale after polishing or sculpting. Although mineral extraction within State Tidelands requires a permit, the

SLC has limited its enforcement of jade collecting violations to cases where major pieces weighing several thousand pounds are being removed. However, the regulations that accompanied designation of the MBNMS specifically prohibit mineral extraction, including jade.

An organization of recreational jade collectors brought this issue to the attention of the MBNMS Advisory Council (made up of federal, State, and local government, industry, environmental, and research representatives) because they believe that low level collection will not cause unacceptable environmental impacts and will not eliminate jade resources present in the region. The MBNMS Advisory Council appointed a sub-committee to review the merits of jade collection and the potential impacts of this activity on resources located within the Sanctuary and State tidelands. Upon consideration of this issue, the MBNMS Advisory Council recommended that both the National Oceanic and Atmospheric and Administration (NOAA) and SLC consider initiating a process for amending or creating new regulations to allow limited recreational jade collection solely within Jade Cove. The collectors worked with NOAA staff to recommend a set of take limitations and monitoring procedures to help ensure that his collection will not have adverse environmental impacts. NOAA has initiated the rule-making process to change the MBNMS regulations and allow limited recreational mineral resource collecting.

Offshore Ocean Zone. While a variety of mineral resources exist offshore the California coast, limitations in technical feasibility and economics, as well as the potential environmental impacts of extraction operations, have halted plans to recover a majority of these minerals in the near future. The federal government is exploring the most appropriate locations to initiate new offshore mining of sand and gravel resources, although exploration has not been extensive and no new operations are currently being proposed in California.

A report titled *U.S. Outer Continental Shelf Sand and Gravel Resources - Programs, Issues and Recommendations* (Outer Continental Shelf [OCS] Policy Committee's Subcommittee on OCS Sand and Gravel Resources 1993), notes the existence of an abundant supply of sand and gravel resources offshore the United States, but the specific localities of these resources are not known without additional study. Mining costs would be higher than nearshore or onshore activities, yet the quality of OCS mineral resources in certain locations is likely to be higher. The report makes a number of recommendations regarding the need for more detailed assessment and characterization studies; clear federal and State policy or regulatory framework for OCS mining; additional public education regarding these operations; demonstration projects to understand feasibility, environmental impacts, and mitigation techniques; and the development of a strong, effective, and adequately funded marine minerals program to help evaluate these questions. Sand resources off the California OCS are located at depths which make extraction impractical with current technology.

Offshore sand and gravel operations are established industries in Japan, the United Kingdom, the Netherlands, and Denmark. However, the California Department of Conservation, Division of Mines and Geology, has determined that offshore aggregate mining along the California coast is unlikely to become a viable alternative to importation of aggregate over land or by ocean transport in the near future, in part because there are few areas where seabed sediments are coarse enough to make construction aggregate. Most seafloor deposits investigated to date are primarily sand, which is more economically and readily extracted from other localities. (Hill, pers. comm.).

Deep Ocean Mineral Resource Extraction. Some mineral resources, such as manganese nodules, occur primarily on the deep ocean areas known as abyssal plains. Development of deep ocean mineral resources could require processing facilities on ships using technology and equipment that is not currently available in the United States. Alternatively, these activities may require onshore processing and storage facilities that could be proposed to be located along the California coast.

In December 1983, a draft Environmental Impact Statement (EIS) was prepared by the Department of the Interior's Minerals Management Service (MMS) regarding the potential offering of 180,000 square kilometers for lease within the Gorda Ridge area, an oceanic spreading center located offshore Northern California and Southern Oregon. During the review of the draft EIS, the federal government, in

cooperation with the states of Oregon and California, investigated the possibility of deep ocean mining within the Gorda Ridge.

The Gorda Ridge Task Force was established in 1984 by the Secretary of the Interior and the Governors of Oregon and California to assess the economic, engineering, and environmental aspects of ocean mining of polymetallic sulfide deposits from this region. Representatives from the Task Force jointly designed and implemented a scientific program that resulted in the discovery of large sulfide deposits offshore Northern California and Southern Oregon. Although substantial information had been developed through this process, the MMS decided in March 1988 not to complete the final EIS based on feasibility problems, potential environmental impacts, and the apparent lack of industry interest. Thus, activities and efforts of the Gorda Ridge Task Force were effectively concluded, as was MMS's involvement in the area for the foreseeable future.

Future deep ocean exploration will depend on economics as well as federal and State policies affecting ocean mining. Environmental concerns, as with offshore petroleum operations, will have a strong influence on policies, although the overall impacts of deep ocean mining are not entirely known at this time. These operations could possibly degrade air and water quality, disrupt living marine resources and their habitats, interfere with fishing activities, and require the construction of onshore processing and distribution facilities along the California coast.

It is not clear as a matter of law whether deep ocean mineral extraction would be covered under the existing Outer Continental Shelf Lands Act (administered by the MMS) or require additional legislation to authorize and regulate this activity. However, the Department of the Interior has taken the position that deep ocean mineral extraction would be regulated by the MMS.

FINDINGS AND RECOMMENDATIONS

Finding

Future oil and gas leasing off the California coast would likely cause unacceptable adverse impacts to offshore resources and coastal communities while contributing relatively little to national energy production. A number of factors lead to this conclusion, including visual impacts, navigation risks, drill muds and cuttings disposal practices, air quality impacts, oil spill risks, ecosystem degradation, and uncertain cumulative impacts from existing, approved, proposed, or projected developments.

Recommendation E-1. ***Retain the prohibition on new oil and gas leasing in State Tidelands, and continue to oppose leasing activities on the federal Outer Continental Shelf offshore California.*** This is, and should remain, the policy of the State of California unless new technologies or other methods are further developed to reduce to acceptable levels the cumulative impacts and risks associated with offshore drilling.

Finding

The cumulative impacts of offshore oil and gas operations for existing or future development within currently leased areas of State Tidelands and the Outer Continental Shelf are being studied. The oil and gas industry, State of California and Department of the Interior's Minerals Management Service have not produced sufficient information regarding the cumulative impacts of offshore oil and gas development. New leasing is currently not allowed in State or federal waters offshore California, yet new developments can still be proposed on existing State or federal leases. A substantial amount of undeveloped leased acreage exists along the California coast and in federal waters within the northern Santa Maria Basin and Santa Barbara Channel located offshore San Luis Obispo and Santa Barbara counties. The Governor recently signed Assembly Bill 1431 (Firestone; Chapter 997, Stats. 1996) which will provide local

governments with approved local coastal programs up to $3.5 million annually from federal oil and gas revenues for addressing ocean and coastal resource management issues. The statute provides that first priority will be to fund projects that mitigate the impacts of offshore energy development.

Recommendation E-2. ***The State of California should continue to cooperate with federal and local governments, the oil and gas industry, and public interest groups to evaluate existing and future onshore constraints to producing oil and gas resources from existing leases in State Tidelands and the Outer Continental Shelf (OCS).*** This evaluation, titled *California Offshore Oil and Gas Energy Resources Study* (COOGER), is focusing on development from currently leased oil and gas tracts off the coastlines of San Luis Obispo, Santa Barbara, and Ventura counties, and is intended to provide a common base of information for future decisions regarding oil and gas activities within existing leased areas.

Finding

The State of California has developed programs to help prevent oil spills and respond to those that do occur, but each major spill response can be used to identify methods for improving such programs. The Office of Oil Spill Prevention and Response (OSPR), and the authorities created by the Oil Spill Prevention Act of 1990, are establishing new and innovative approaches to oil spill prevention and response in California. Investigations by OSPR committees and their staff are identifying the current state of oil spill prevention measures and response preparedness through the legislatively-mandated Coastal Protection Review, while work is ongoing to identify and analyze the legal and operational roles of most agencies involved with oil spill prevention and response.

Recommendation E-3. ***The State of California should place high priority on implementing measures necessary to provide best achievable protection from oil spills.*** Specifically, the State should consider the recommendations from the first OSPR Coastal Protection Review. This will help ensure that the best achievable protection measures are implemented to prevent and respond to oil spills along the California coast. Some of the recommendations could be implemented immediately, while others may require additional time and analysis.

Finding

Many offshore oil and gas platforms are reaching the end of either their design or economic producing life and decisions must be made regarding the most appropriate methods to rehabilitate, use, or dispose of these facilities. The current policies and regulatory procedures regarding offshore platforms proposed for abandonment require that production sites be restored to pre-project conditions. Some interest groups have advocated the use of abandoned platform facilities as artificial reefs, while others have indicated substantial opposition to such proposals. The impacts of different abandonment alternatives have not been evaluated through a Programmatic Environmental Impact Report/Statement (EIR/S) process, but this information would be extremely helpful for understanding the multiple alternatives and could expedite future decisions regarding platform abandonments.

Recommendation E-4. ***The State, in coordination with the U.S. Minerals Management Service and other federal agencies, should prepare a Programmatic EIR/S to evaluate the impacts associated with offshore oil and gas platform abandonment alternatives.*** The EIR/S should include evaluations of totally removing facilities, leaving all or some portions of the facilities in place for use as habitat, assuming the cost and transfer of title and liability, effects on

biological productivity, and suitability of metal oil platform jackets for creating habitat.